DISK RECORDING AND REPRODUCING APPARATUS

Abstract:
PROBLEM TO BE SOLVED: To easily update a firmware and a write strategy even with a disk player which cannot handle binary data.
SOLUTION: Data to be updated of the firmware and data to be updated of the write strategy are recorded on the disk as text data of CD-TEXT. An identifier is described in ID1=86h which indicates a disk ID. When the identifier is detected from the reproduced data of the CD-TEXT, on the basis of the detected identifier, the data for updating the firmware and the data for updating the write strategy are formed from the text data reproduced as the CD-TEXT, and thereby, data of the firmware and data of the write strategy are updated.

TECHNICAL FIELD

[Field of the Invention]
Especially in this invention, a CD-DA (Compact Disc Digital Audio) disk, CD-R (Compact Disc Recordable). A disk and CD-RW (Compact DiscReWritable) It is related with the disk recording playback equipment which carries out record reproduction of the disk.
Therefore, it is involved in the thing which enabled it to perform easily renewal of light strategy, and renewal of firmware especially.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001] [Field of the Invention]
Especially in this invention, a CD-DA (Compact Disc Digital Audio) disk, CD-R (Compact Disc Recordable). A disk and CD-RW (Compact DiscReWritable) It is related with the disk recording playback equipment which carries out record reproduction of the disk.
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[0002] [Description of the Prior Art]

The CD-R disk which is recordable CD (Compact Disc), and the CD-RW disk which is CD in which re-recording is possible have spread. And it not only plays the music data recorded on CD-DA, but the disk recording playback equipment which enabled it to record a user's favorite music data on a CD-R disk or a CD-RW disk is known.
[0003] The microprocessor is carried in almost all electronic equipment in recent years, such as disk recording playback equipment which carries out record reproduction of a CD-R disk or the CD-RW disk. In such electronic equipment, the program and various kinds of data for operating a microprocessor are stored in the memory non-volatile as firmware.
[0004] As firmware with which a program and data are stored, the rewritable memory of a flash memory etc. is used increasingly in recent years. If firmware is constituted using the rewritable memory of a flash memory etc., by renewal of firmware, debugging of a program and upgrade, change of a parameter, etc. can be made.

[0005] In the CD-R disk or the CD-RW disk, the standards of the physical characteristic or the optical characteristic are defined, and the CD-R disk and CD-RW disk which are marketed now are manufactured so that the physical characteristic and optical characteristic may satisfy standards. However, since a that it is small difference arises in a manufacturing method, construction material, etc. for every manufacturing maker of a disk, or kind of disk, the parameter of the optimal light strategy changes. Then, the parameter of the optimal light strategy is beforehand called for for every kind of each manufacturing maker or media, and the parameter of this optimal light strategy is accumulated in the memory of the disk recording playback equipment which performs record reproduction of a CD-R disk or a CD-RW disk.

[0006] That is, in a CD-R disk or a CD-RW disk, EFM (8 to 14 Modulation) of the data is carried out, and it is recorded. EFM changes 8-bit data into 14 bits.
The EFM signal consists of the space between the physical length from "3T" to "11T." Therefore, when recording the data modulated by EFM, it is important to record an edge part correctly.

[0007] If a laser beam is made to turn on and off with an EFM signal simply and data is recorded on a disk when recording such an EFM signal on a CD-R disk or a CD-RW disk, Immediately after one [a laser beam], immediately after not forming a pit and making a laser beam turn off, since temperature up is insufficient, since it is not fully cooled, a pit will continue, and will be formed and the edge of a pit is not recorded correctly.

[0008] Then, when driving a laser beam, a pulse is enlarged, temperature up is fully carried out, a laser beam is stopped and the pit is kept from continuing before falling of an EFM signal in the standup of an EFM signal, as shown in drawing 21 B. Thereby, a pit is formed as shown in drawing 21 A. Thus, control of the laser beam at the time of the writing of data and rewriting is called light strategy.

[0009] The optimal parameters of into how much time which raises how many power in the standup of an EFM signal, and is raising power is made, lowering power from before how much [of falling of an EFM signal], etc. and light strategies differ for every manufacturing maker of a disk, and kind of disk.

[0010] The parameter of this light strategy is determined [beforehand and] through various experiments. And the parameter of the optimal light strategy is accumulated in a memory for every manufacturing maker of a disk, or kind of disk.

[0011] Thus, the parameter of light strategy is memorized by the memory in the recording and reproducing device which performs record reproduction of a CD-R disk or a CD-RW disk. The parameter of this light strategy is determined [beforehand and] through various experiments.

[0012] However, also after the recording and reproducing device is put on the market, a new kind of a CD-R disk and a CD-RW disk are sold. Thus, the parameter of the optimal light strategy is not prepared for a memory about the disk which appeared after the market introduction of the recording and reproducing device.

[0013] Then, when a new disk appears, to update light strategy is desired so that the parameter of the optimal light strategy for a new disk may be prepared and the parameter of the optimal light strategy for this new disk may be contained.

[0014] [Problem(s) to be Solved by the Invention]

Thus, in the recording and reproducing device which performs record reproduction of a CD-R disk or a CD-RW disk. To update firmware is desired, when the program of the microprocessor is memorized by the memory as firmware and upgrades the firmware of

this microprocessor. When a new disk appears, to update light strategy is desired so that the parameter of the optimal light strategy for this new disk may be contained.

[0015] However, the disk recording playback equipment for audios is performing record reproduction of the disk for music with which audio information was recorded for exclusive use, and cannot carry binary data. For this reason, a user can perform easily neither renewal of light strategy, nor renewal of firmware.

[0016] That is, in order to perform renewal of firmware, and renewal of light strategy, it is necessary to provide the data of firmware, and the data of light strategy with binary data. However, for example, with the disk recording playback equipment for the record reproduction of music data, the disk with which binary data was recorded cannot be carried. For this reason, in performing renewal of firmware, and renewal of light strategy, it is necessary to prepare apparatus, such as a personal computer which can treat binary data, to connect a personal computer and disk recording playback equipment, and to send binary data to disk recording playback equipment from a personal computer.

[0017] In order to enable such operation, it is necessary to prepare the connector and cable which connect between a personal computer and disk recording playback equipment, and to install the application program for rewriting of a memory in a personal computer.

[0018] However, it is difficult to prepare such apparatus or to operate the application for rewriting of a memory in a common user. For this reason, under the present circumstances, in order to perform renewal of firmware, and renewal of light strategy, it is necessary to carry that apparatus into a service station.

[0019] Therefore, the purpose of this invention is to provide simply the disk recording playback equipment which can perform renewal of firmware, and renewal of light strategy also with the disk reproduction device which cannot carry binary data.

[0020] [Means for Solving the Problem]

As for this invention, the 1st disk that is characterized by that disk recording playback equipment comprises the following and with which text information to which an identifier is given is recorded, and the 2nd disk that can be written in are removable disk recording playback equipment selectively.

A reproduction means which plays text information to which an identifier is given from the 1st disk when equipped with the 1st disk.

A recording device which records data to the 2nd disk when equipped with the 2nd disk.

A memory means a program or a preset value about a recording device is remembered to be.

A discriminating means which distinguishes whether a program or a preset value about record reproduction memorized by memory means based on text information is updated based on an identifier given to text information reproduced in a reproduction means.

[0021] Update information of firmware and update information of light strategy are recorded on a disk as text data of CD-TEXT. An identifier is described by 1= 86h of ID which shows disk ID. If an identifier is detected from regenerative data of CD-TEXT, based on this identifier, From text data reproduced as CD-TEXT, data for renewal of firmware and data for renewal of light strategy are formed, and, thereby, update information of firmware and update information of light strategy are performed.

[0022] Thus, also in the case of disk recording playback equipment for music which cannot carry binary data, since data of CD-TEXT is used, renewal of form wear and

renewal of light strategy can be performed easily.

[0023] And by detecting an identifier of CD-TEXT, since it can judge data about what is recorded as CD-TEXT, renewal of data can be easily performed without a user's special operation. Since the usual music data is recordable as data of a program area, while reproducing music data, renewal of firmware and renewal of light strategy can be performed.

[0024] [Embodiment of the Invention]

Hereafter, this embodiment of the invention is described with reference to drawings. This invention is applied to the disk recording playback equipment for playing the music data recorded on the CD-DA disk, and a CD-R disk or a CD-RW disk, and recording music data on a CD-R disk or a CD-RW disk. In the disk recording playback equipment to which this invention was applied, CD-TEXT which recorded the text data relevant to a disk can be played now. In the standard of CD-TEXT, text data can be recorded now also on the field and program area of a lead-in groove. Although any other (?whichever) of the field and program area of a lead-in groove may be used, he is trying to use CD-TEXT of a lead-in groove field in this example.

[0025] Before explaining such disk recording playback equipment, the composition of a CD-DA disk, and a CD-R disk and a CD-RW disk and CD-TEXT are explained.

[0026] Drawing 1 shows the composition of the optical disc 1 like a CD-DA disk, and a CD-R disk and a CD-RW disk. In drawing 1, the diameter is 120 mm and the optical disc 1 has the hole 2 in the center. As the optical disc 1, there are some which are called what is called a CD single 80 mm in diameter.

[0027] TOC (table Of contents) for carrying out program management to the optical disc 1 toward a periphery from the inner circumference The lead-in groove field 3 where data was recorded, The program area 4 where program data was recorded, and a program end region and what is called the lead-out field 5 are formed.

[0028] A CD-DA disk is exclusively for playback, and aluminum is used as a member of a recording layer in the CD-DA disk. In the case of the CD-DA disk, the disk is mass-produced using La Stampa, and where music data is recorded, it is usually sold.

[0029] A CD-R disk can be written in and organic coloring matter, such as phthalo-cyanine and cyanine, is used for a recording layer. As for data, in CD-R, temperature up of the organic coloring matter on a disk is carried out by laser at the time of writing. Thereby, heat modification of the organic hue is carried out.

[0030] A CD-RW disk can be rewritten and a phase change material is used for a recording layer. As for a phase change material, the alloy of Ag-In-Sb-Te (silver-indium antimony tellurium) is used. Such a substance has a phase of a crystal phase and an amorphous phase (amorphous). From an amorphous phase, a crystal phase differs in reflectance.

[0031] In the case of the CD-R disk or the CD-RW disk, the disk is sold in the state of no recording, and the user is usually doing record reproduction of the music data to the disk which is not recorded [this] .

[0032] In the CD-DA disk with which audio information was recorded, a CD-R disk, and a CD-RW disk, audio information is recorded on the program area 4, and the hour entry of this audio information, etc. are managed in the lead-in groove field 3. When read-out of the audio information in the program area 4 by disk recording playback equipment is completed and a pickup arrives at the lead-out field 5, the reproduction motion of a CD-DA disk is completed.

[0033] The sub-code other than the audio information as main data is recorded on the

CD-DA disk with which audio information was recorded, the CD-R disk, and the CD-RW disk.

[0034] That is, one sample or 1 word is 16 bits, and the audio signal recorded on a CD-DA disk, a CD-R disk, and a CD-RW disk is sampled by a 44.1-kHz sampling frequency. One sample or 1 word 16 bits are divided into top 8 bits and 8 bits of low ranks, this sampled data is made into a symbol, respectively, and error correcting code-ized processing and interleave processing are performed by this symbol unit. Audio information is gathered in one frame every 24 symbols. One frame is equivalent to six samples each of a stereo right-and-left channel. 8 bits of each symbol are changed into 14 bits by eight-to-fourteen modulation.

[0035] Drawing 2 shows the data structure of one frame after 8-to-14 modulation. As shown in drawing 2, one frame consists of the synchronous pattern information fields of 24 channel bits, sub-code fields of 14 channel bits, and the program data of a channel bit (32x14) and parity data areas. In order to connect each field or a data part, the joint bit of three channel bits is allotted to each portion. Therefore, one frame contains the data of a total of 588 channel bits.

[0036] As shown in drawing 3, in the frame constituted in this way, 98 frames are collected and a sub-code block is constituted.

[0037] Drawing 3 shows the composition of a sub-code block. As shown in drawing 3, a sub-code frame comprises a frame synchro pattern part, a sub-code part, and data and a parity part. This one sub-code frame is equivalent to 1/75 seconds of regeneration time.

[0038] As the data of a sub-code part is shown in drawing 4, the top frame F01 and the frame F02 are the alignment pattern S0 of a sub-code frame, and S1. This alignment pattern is a pattern of the AUTOO velvet of an 8-to-14 modulation method as well as a frame synchro pattern. Each 8-bit bit of one symbol constitutes W channel from a P channel of a sub-code, respectively. For example, P channel -- each of S0 and S1 -- it comprises P01 to a part and P96.

[0039] P channel of a sub-code has the information corresponding to the existence of the program, and information, including the absolute time information on CD, the hour entry of each program, a program number (called a track number), a movement number (called an index), etc., is included in Q channel. Therefore, by control of reproduction motion, such as a head broth of a program, being possible, and displaying the information on Q channel using the information included in Q channel, It can be visually checked for the lapsed time of a performance, the absolute time from the start, etc. a program of what position on an optical disc the program under performance is.

[0040] CD-TEXT records additional text using the data for six channels from R channel of a sub-code to W channel. It enables it to correspond to the language of eight nations as addition text.

[0041] Drawing 5 A shows the data recorded on a CD-DA disk, a CD-R disk, and a CD-RW disk. As drawing 1 was also explained, the data of program No.1 currently recorded on the TOC data currently recorded on the lead-in groove field sequentially from the inner circumference side and a program area - No.n, and read out area is recorded.

[0042] As shown in drawing 5 B, Q channel of a sub-code is being used for the TOC data currently recorded on the existing CD-DA disk, the CD-R disk, and the CD-RW disk. The sub-code has a data structure which makes 98 bits one frame. 72 bits in these 98 bits are data.

[0043] In the case where the number of programs is 6, the data structure in TOC shall be shown in drawing 6. In the case where POINT(s) are 00-99, P_{MIN}, P_{SEC}, and P_{FRAME} show the start address (absolute time) of each program. In the case where POINT is A0, P_{MIN} shows the program number of the program of the beginning of a disk, and P_{SEC} and

P_{FRAME} are set to 00. In the case where POINT is A1, P_{MIN} shows the program number of the last program and P_{SEC} and P_{FRAME} are set to 00. In the case where POINT is A2, P_{MIN}, P_{SEC}, and P_{FRAME} show the address which lead-out starts. And these contents are repeated 3 times respectively, as shown in drawing 6. It is repeatedly recorded on a lead-in groove field. Such TOC data are read with playback equipment at the time of wearing of CD, and are memorized by the memory inside a device.

[0044] Drawing 7 shows the composition of the data in the case of CD-TEXT (mode 4). The 72-bit data in one frame of the sub-code of Q channel is used, and, in the case of existing CD, the total number of programs (music) and the recording position of each program are managed. More specifically, the program number which can take the value to 00-99, the start address (absolute time) corresponding to each program, the first program number, the last program number, and the address with which lead-out starts are recorded.

[0045] In addition to the sub-code of this Q channel, in CD-TEXT, the data of the text which comprises an R channel as shown in drawing 7 - a W channel is recorded on a lead-in groove field.

[0046] Two frames of the head of the data which consists of a R-W channel are the alignment pattern S0 and S1. The symbol whose each is 6 bits at the 96 remaining frames is 96 symbol are rare. These 96 symbols are quadrisected at a time by 24 symbols. These 24 symbols are called one pack and four packs are called one packet.

[0047] The mode information which sets up the recording mode of the information recorded on the head position of each pack by the pack, The ID areas where a total of the 24-bit ID code containing the ID code (ID2, ID3, and ID4) which has the identification information of ID1 which has the identification information which shows the kind of text information, and others is recorded are arranged. The text area where the text information which accompanies main data by 8 bitwises is recorded behind these ID areas is allotted. The CRC field where the 16-bit data for performing error detection by a cyclic code (CRC:cyclic redundancy code) as an error detecting code is recorded on each pack is allotted.

[0048] Drawing 8 shows the outline of a format of CD-TEXT. All the text is recorded into a text group. The text group with text group same in a lead-in groove field is recorded repeatedly. One text group is constituted by eight blocks at the maximum. The example in which one text group comprises two blocks (the block 0 and the block 1) is shown by drawing 8.

[0049] The character code in the case of English shall depend the block 0 on 8859-1 including English text. As for the block 1, the character code in the case of Japanese is made into MS-JIS including Japanese text. Each block is constituted by the pack 0 - the pack n.

[0050] Drawing 9 A is a figure showing the data format shown by drawing 7 as serial data. As shown in drawing 9 A, 32-bit data (drawing 9 A shows 24 bits) is divided into the data for every byte from a head, these bytes are assigned to ID1 for discernment, ID2, ID3, and ID4, and ID (or header) field is formed. A subsequent text area is also divided into the data of a byte unit.

[0051] A text area is 12 bytes in length, and, finally 2 bytes of CRC field is provided. A length of 18 bytes which consists of these ID areas, a text area, and a CRC field is called a pack. By processing of such a byte unit, it becomes possible to process with the disposal method of the signal of Q channel, and it is possible with the composition of an easy processing circuit.

[0052] It limits to detecting an error using the error detecting code by CRC, and if an error is detected, he is trying to read data again in the data format of CD-TEXT. For this

reason, 4-fold writing of the data is carried out for every pack within TOC, for example, and further a series of data rows are repeatedly recorded by the packet unit. That is, four packs are included in one packet in sync with the sub-code sink which has a cycle of 1 / 75 seconds. By such multiplex recording, the complicated circuit for an error correction is omissible.

[0053] Multiplex writing of a pack unit may not be restricted to 4-fold writing, and may carry out multiplex writing also of the unit of multiplex writing in this periodic unit not only in a pack unit, for example by making a packet unit or a number packet into a cycle.

[0054] ID1 of the head of ID areas will be treated at 8 bits, as shown in drawing 9 B. A triplet writes in the data for identifying the mode from MSB so that this playback equipment may not cause malfunction, even if it equips the CD reproduction device which has a function which decrypts the existing sub-code of the R thru/or W channel. In the case of the CD-TEXT format recorded on a lead-in groove field, as the mode shown by this triplet, before a CD-TEXT format is proposed, the mode 4 ("100") which was an undefined is assigned. Since the mode which cannot be recognized is only detected by carrying out like this even if it equips existing playback equipment, playback equipment does not have a possibility of only suspending operation and malfunctioning.

[0055] In this example the mode 4 is instructed to be by ID1. One pack includes the header area which consists of ID1, ID2, ID3, and ID4 which were divided into every 8 bits (1 byte), the text area which consists of the text bytes text1-text12, and the CRC field which consists of a 16-bit CRC code, as shown in drawing 10.

[0056] ID1 has 8-bit structure, and as the contents of the data treated in ID1 and a pack show drawing 11, it is specified. ID1 is carried out in order to direct the mode 4 in the bit by the side of a higher rank (h (8xh) means a hexadecimal number and x means the value of 4 bits by the side of a low rank), as mentioned above.

[0057] ID1 shows the contents of the character string which continues after text1. An album name / program name, and (81h) (80h) A player / conductor / orchestra name, A versification person and (83h) a composer and (84h) an arrangement person and (85h) (82h) A message, Disk ID and (87h) the keyword for search, and (88h) (86h) TOC, As for reserve and (8dH), (89h) is [2nd TOC, (8Ah), (8Bh), and (8Ch) / UPC / EAN (POS code) of an album and ISRC of each track, and (8Fh of closed information and (8Eh))] the size information of a block. Reserve is an undefined now and will mean in the future what is defined.

[0058] ID2 contains a 1 bit extended flag, a 7-bit track number, or a pack element number. A track number shows the track number in which the character of the beginning of the text data of the pack belongs. As shown in drawing 12, the track numbers from one to 99 are recorded on ID2. Since a track number is 1 to 99, more than numerical values "0" other than this and "100" (64h) have special semantics. "00" means the information representing an entire disk. MSB is always set to 0 and 1 becomes a flag for extension. A pack element number is used depending on the kind of pack shown by ID1.

[0059] ID3 is the sequence number (sequence number) given to the pack. As shown in drawing 13, the sequence number of the pack within a block is from 00 to 255 (from 0 to FFh). ID3=0 is always a head pack of 1= 80 h of ID.

[0060] ID4 consists of 4 bits which shows the 1 bit (MSB) DBCC (Double Byte Character Code) identification bit, the block number, and the character position of a pack of a triplet, as shown in drawing 14. A DBCC identification bit is set to "1" in the case where a block contains a DBCC character string. In the case of S(Single) BCC character string, this is set to "0." A block number shows the number of the block with which the pack belongs. The character of text1 of the present pack shows the how many

characters they are [4 bits / which shows a character position]. In "0011", "0100", and ..., the first character and "0001" are ["0000" / the 2nd character and "0010" / the 3rd character and the following] the characters of the 4th, the 5th, and ...

[0061] Text data consists of 12 bytes, as mentioned above, and it contains the character string depending on the kind of pack shown by ID1. a character string -- the null as the series and termination child of a character -- it consists of codes. a null -- a code -- the case of SBCC -- one null -- the case where a code is used and it is DBCC -- two nulls -- a code is used. a null -- as a code, (00h) is used and it is recommended that there is less size of a character string than 160 bytes.

[0062] He changes the update information of the data of firmware, and the update information of light strategy into text data, and is trying to record them on the data of such CD-TEXT in this invention.

[0063] For example, as a flow chart shows [drawing 15], when carrying out renewal of firmware, and renewal of light strategy, update information is prepared (Step S1) and this update information is changed into text data from binary data (Step S2). And the identifier according to the kind of update information is set up (Step S3), and the disk with which the update information changed into the text data was recorded as CD-TEXT is created (step S4).

[0064] The example in the case of changing binary data like the parameter of light strategy or firmware into text data, and recording as CD-TEXT is as follows.

[0065] As shown in drawing 7 and drawing 9, a total of 18 bytes of 4 bytes of ID areas, 12 bytes of text area, and 2 bytes of CRC field comprise a standard of CD-TEXT as one pack. ID areas consist of ID1, ID2, ID3, and ID4. Although the data of a maximum of 255 packs is recordable on a lead-in groove, when record removes five indispensable packs as data of CD-TEXT, things recordable as data are 250 packs.

[0066] In order to identify that it is the disk with which the update information of such firmware and the update information of light strategy were recorded, disk ID -- it is (1= 86h of ID) -- when it is used for the pack of disk identification information (refer to drawing 11), the capacity which can actually record update information will be called 249 packs (249x12 bytes = 2988 bytes), i.e., 2988 bytes. The text data equivalent to these 2988 bytes is recorded on the pack which is reserved, for example (ID1=8Ch).

[0067] If the update information of firmware and the update information of light strategy are called for by the maker side of apparatus and update information is prepared at Step S1 as drawing 15 showed, the binary data of update information will be changed into text data at Step S2. If update information is changed into text data from binary data, the text data of an identifier will be written in the text data field of (1= 86h of ID) as disk identification information at Step S3.

[0068] This identifier may be attached how. For example, if it is the update information of light strategy, an identifier is set to "WSDATA0000001", and an identifier is set to "FWDATA0000001" if it is the update information of firmware.

[0069] And the update information changed into the text data is written in the field of the text data of 249 packs set to (ID1=8Ch) one by one by step S4.

[0070] The conversion to binary data from text data, For example, 1 byte of binary data is divided into top 4 bits and 4 bits of low ranks, Each data of top 4 bits and 4 bits of low ranks is made into 4 bits of low ranks of the text data for two characters (one character is 1 byte) of a converting destination, respectively, and it can realize by making top 4 bits of the text data of each character of a converting destination into a predetermined number (for example, 3h). In this case, 1 byte of binary data is changed into two characters (2 bytes) of the text data expressed by 1 byte.

[0071] Drawing 16 is a flow chart which shows the processing in the case of changing into text data from binary data. In drawing 16, when changing into text data from binary data, address selection of a changing agency is made into a=A, converting destination address selection is made into b=B, and conversion ending-address setting out is made into e=A+N (Step S11).

[0072] Divide the binary data of a changing agency into a higher rank nibble (top 4 bits) and a low rank nibble (4 bits of low ranks), and it is processed, A higher rank nibble is made into the text data of the low rank nibble of the converting destination address b, and let a low rank nibble be text data of the low rank nibble of the converting destination address b+1 (Step S12).

[0073] The higher rank nibble of the address b of a converting destination shall be 3 h, and the higher rank nibble of the address b+1 of a converting destination shall be 3 h (Step S13).

[0074] And a conversion source address is updated by a=a+1, and a converting destination address is updated by b=b+2 (Step S14).

[0075] If it is judged whether conversion source address a reached conversion ending-address e (Step S5) and conversion source address a has not reached conversion ending-address e, a return is carried out to Step S2, and the conversion process to the text data of 1 byte of following binary data is performed.

[0076] At Step S5, if conversion source address a has reached conversion ending-address e, processing will be ended.

[0077] For example, this data is divided into top 4-bit F_h and 8_h of 4 bits of low ranks when changing $F8_h$ binary data into text data by hexadecimal display, as shown in drawing 17. And top 4-bit F_h of binary data is used as the data of 4 bits of low ranks of text data, 3_h is added to 4 bits of the higher rank, and it is considered as the text data of $3F_h$. 8_h of 4 bits of low ranks of binary data is used as the data of 4 bits of low ranks of text data, 3_h is added to the top 4 bits, and it is considered as the text data which is 38_h. As a result, one byte of binary data shown by $F8_h$ is changed into the text data shown by $3F_h$, and the text data for two characters of the text data shown by 38_h.

[0078] The conversion to binary data from text data should just process above-mentioned processing on the contrary.

[0079] For example, as shown in drawing 17, in changing into binary data the text data for two characters of the text data expressed by 34_h, and the text data expressed by $3C_h$. 4_h of 4 bits of low ranks of text data expressed by 34_h shall be extracted, and shall be top 4 bits of one byte of binary data after conversion. Next, only C_h of 4 bits of low ranks is extracted, and let the text data expressed by $3C_h$ be 4 bits of low ranks of one byte of binary data after conversion. As a result, the text data for two characters of the text data expressed by 34_h and the text data expressed by $3C_h$ is changed into one byte of binary data of $4C_h$.

[0080] Conversion with binary data and text data is not limited to such a conversion process. For example, it may be made to use the conversion program (for example, ISH) of binary data and text data.

[0081] When carrying out upgrade of firmware, and renewal of light strategy, as the flow chart showed to drawing 15, the optical disc in which the update information of firmware and the update information of light strategy were recorded as data of CD-TEXT is created. As shown in drawing 18, the optical disc 11 created in this way is provided by the manufacturer of the disk recording playback equipment 12.

[0082] The user side will equip a user's disk recording playback equipment 12 with this optical disc 11, if offer of the optical disc 11 for carrying out renewal of firmware and renewal of light strategy is received from the manufacturing maker side of the disk

recording playback equipment 12.

[0083] If a user's disk recording playback equipment 12 is equipped with the optical disc 11 and this optical disc 11 is played, the text currently recorded on this optical disc 11 as CD-TEXT being played, and, When it is discriminated from the identifier of this CD-TEXT that it is the update information of firmware, it is changed into binary data by text data and with this binary data. If renewal of firmware is made and it is discriminated from the identifier of CD-TEXT that it is the update information of light strategy, text data will be changed into binary data and renewal of light strategy will be made with this binary data.

[0084] The distributed disk is specifically played by each user's disk recording playback equipment 12 side, and processing as shown in drawing 19 with a flow chart is performed.

[0085] In drawing 19, it is data ********** (Step S21) of CD-TEXT. And it is judged whether 1= 86 h of ID which is disk ID has an identifier (Step S22).

[0086] When it is judged at Step S22 that 1= 86_h of ID has an identifier, it is judged whether the identifier of (1= 86_h of ID) is "FWDATA", and it is the update information of firmware (Step S23).

[0087] At Step S23, if it is judged that it is the update information of firmware, the text data of ID1=$8C_h$ will be read and this text data will be changed into binary data (Step S24). And firmware is updated with this binary data.

[0088] When it is judged at Step S23 that it is not the update information of firmware, it is judged whether the identifier of (1= 86_h of ID) is "WSDATA", and it is the update information of light strategy (Step S26).

[0089] At Step S26, if it is judged that it is the update information of light strategy, the text data of ID1=$8C_h$ will be read and this text data will be changed into binary data (Step S27). And light strategy is updated with this binary data (Step S28).

[0090] When it is judged at Step S26 that it is not the update information of light strategy, processing corresponding to other identifiers is performed (Step S29). At Step S22, when there is an identifier of 1= 86_h of ID, the display of CD-TEXT is not performed. When it is judged at Step S22 that there is no identifier of 1= 86_h of ID, display processing of usual CD-TEXT is performed (Step S30).

[0091] The update information of firmware and the update information of light strategy may record what kind of data about the program area in this way in the optical disc recorded as CD-TEXT. It may be made to record music data as well as the usual optical disc, and may be silent.

[0092] When the update information of firmware and the update information of light strategy record music data on the program data of the optical disc recorded as CD-TEXT, a user, data can be updated without carrying out consciousness of updating data listening to the music currently recorded on the optical disc. The sound of how to use the optical disc for a program area, etc. may be recorded.

[0093] Since it is necessary to mass-produce the optical disc in which the update information of firmware and the update information of light strategy were recorded, it is common to consider it as a CD-DA disk, but it may be made to provide it by the CD-R disk or a CD-RW disk. For example, although it is the same kind of apparatus, it may be necessary to perform renewal of firmware, and renewal of light strategy only about the apparatus of a specific period of production or a production plant. In such a case, since the optical disc in which the update information of firmware and the update information of light strategy were recorded will be produced in small lots, A CD-R disk will be used as an optical disc in which the update information of firmware and the update information of light strategy were recorded.

[0094] By thus, the thing which the parameter of light strategy and the binary data of firmware are changed into text data, and is recorded on the disk as CD-TEXT in this invention. Also in the case of the disk recording playback equipment for music which cannot carry binary data, renewal of light strategy and renewal of firmware can be performed easily.

[0095] Drawing 20 shows the composition of the disk recording playback equipment in which this invention was applied. In drawing 20, 101 is an optical disc. In regeneration, it is equipped with the CD-DA disk with which music data was recorded, a CD-R disk, and a CD-RW disk as the optical disc 101. The data of CD-TEXT may be recorded on the CD-DA disk with which this music data was recorded, the CD-R disk, and the CD-RW disk.

[0096] When recording music data on the optical disc 101, it is equipped with a CD-R disk and a CD-RW disk as the optical disc 101.

[0097] It is equipped with the CD-DA disk with which the update information of firmware and the update information of light strategy were recorded as text data, a CD-R disk, and a CD-RW disk when carrying out renewal of firmware, and renewal of light strategy. The disk with which the update information of firmware and the update information of light strategy were recorded as text data is usually a CD-DA disk.

[0098] The CD-DA disk with which music data was recorded as the optical disc 101, In playing the CD-DA disk with which it was equipped with the CD-R disk and the CD-RW disk, and this music data was recorded, a CD-R disk, and a CD-RW disk, The optical disc 101 rotates with the spindle motor 103, and the record signal of the optical disc 101 is played by the optical pickup 102.

[0099] The optical disc 101 rotates with the spindle motor 103. Rotation of the spindle motor 103 is controlled by the spindle servo circuit 104 by CLV (constant linear velocity), for example.

[0100] Although the optical pickup 102 is not illustrated, it is made radially movable [a disk] by the pickup feeding mechanism. The biaxial mechanism is formed in the optical pickup 102, and servo control is performed to a focusing direction and a tracking direction by the servo signal processing circuit 105.

[0101] The regenerative signal of the optical pickup 102 is supplied to the playback amplifier 121. The regenerative signal of the optical pickup 102 is amplified with the playback amplifier 121. A tracking error signal and a focus error signal are generated from the playback amplifier 121. This tracking error signal and focus error signal are supplied to the servo signal processing circuit 105, the biaxial mechanism of the optical pickup 102 is controlled based on this tracking error signal and focus error signal, and a tracking servo and a focus servo are performed.

[0102] The output of the playback amplifier 121 is supplied to the EFM demodulator circuit 122, and the clock extraction circuit 123 is supplied. A bit clock is extracted in the clock extraction circuit 123. This bit clock is supplied to the EFM demodulator circuit 122, and it is supplied to the spindle servo circuit 104. Control of CLV is performed by controlling the spindle motor 103 by the spindle servo circuit 104 so that the cycle of this bit clock becomes fixed.

[0103] Recovery processing of EFM is performed in the EFM demodulator circuit 122. The output of this EFM demodulator circuit 122 is supplied to the error correction circuit 124. The output of the EFM demodulator circuit 122 is supplied to the sub-code decoder 125. Subcode data are decoded by the sub-code decoder 125. The subcode data of decoded P channel and Q channel are supplied to the microprocessor 116.

[0104] The data of the sub-code of R to decoded W is supplied to the CD-TEXT decoder 126. The text data of CD-TEXT may be recorded on the optical disc 101 by the

sub-code of W channel from R of the lead-in groove. In this case, text data is decoded by the CD-TEXT decoder 126. This text data is supplied to the microprocessor 116.

[0105] It is the error correction circuit 124 and error correction processing by CIRS (Cross Interleave Reed Solomon) is performed, for example. Audio information is decoded by the error correction circuit 124. This audio information is supplied to D/A converter 127, and it is supplied to the digital interface 112. By D/A converter 127, digital audio signals are changed into an analog audio signal, and this analog audio signal is outputted from the analog audio output terminal 128. Digital audio signals are outputted via the digital interface 112.

[0106] In being equipped with a CD-R disk and a CD-RW disk and recording music data on the optical disc 101 as the optical disc 101, The analog audio signal from the analog audio signal input terminal 111 is supplied to A/D converter 113, by A/D converter 113, an analog audio signal is digitized and the output of this A/D converter 113 is supplied to the error correction code-ized circuit 114. Or the digital audio signals from the digital interface 112 are supplied to the error correction code-ized circuit 114.

[0107] As opposed to the digital audio information which should be recorded, the error correction code by CIRC is added in the error correction code-ized circuit 114.

[0108] The output of the error correction code-ized circuit 114 is supplied to the eight-to-fourteen modulation circuit 118. Eight-to-fourteen modulation of the record data is carried out in the eight-to-fourteen modulation circuit 118. Subcode data are supplied to the 8-to-14 modulation circuit 118 from the sub-code encoder 115.

[0109] Subcode data are supplied from the microprocessor 116, and text data is supplied to the sub-code encoder 115 from the CD-TEXT encoder 117. With the sub-code encoder 115, the data of P channel of a sub-code and Q channel is encoded, and text data is encoded using W channel from R channel of a sub-code. This subcode data and text data are supplied to the 8-to-14 modulation circuit 118, subcode data are added to the sub-code field of P channel and Q channel, and text data is added to the sub-code field of W from R.

[0110] The output of the eight-to-fourteen modulation circuit 118 is supplied to the optical pickup 102 via the light strategy circuit 119 and the recording amplifier 120. The laser beam from the optical pickup 102 is irradiated towards the optical disc 101, and, thereby, audio information is recorded on the optical disc 101.

[0111] The light strategy circuit 119 controls light strategy based on the parameter of the light strategy accumulated in the light strategy memory 131.

[0112] Namely, if a laser beam is made to turn on and off with an EFM signal simply and data is recorded on a disk when recording an EFM signal on the optical discs 101, such as a CD-R disk and a CD-RW disk, Immediately after one [a laser beam], immediately after not forming a pit and making a laser beam turn off, since temperature up is insufficient, since it is not fully cooled, a pit will continue, and will be formed and the edge of a pit is not recorded correctly. Then, when driving a laser beam, a pulse is enlarged, temperature up is fully carried out, a laser beam is stopped and the pit is kept from continuing before falling of an EFM signal in the standup of an EFM signal. Thus, the parameter of into how much time which raises how many power in the standup of an EFM signal, and is raising power at the time of the writing of data and rewriting is made, lowering power from before how much [of falling of an EFM signal] is a parameter of light strategy.

[0113] The parameters of the optimal light strategy differ for every kind of each disk, or manufacturing maker. And the parameter of the optimal light strategy is beforehand called for by experiment, and the parameter of this optimal light strategy is memorized by the light strategy memory 131.

[0114] The light strategy circuit 119 is controlling the laser beam outputted from the optical pickup 102 according to the parameter of the light strategy memorized by this light strategy memory 131.

[0115] The microprocessor 116 is controlling the whole device. An input is given to this microprocessor 116 from the operation input section 132. Various kinds of established states are displayed on the indicator 133.

[0116] The program of the microprocessor 116 is memorized by the program memory 134 as firmware. the memory which this program memory 134 can rewrite [of a flash memory etc.] -- it is carried out.

[0117] In carrying out renewal of firmware, and renewal of light strategy, It is equipped with the CD-DA disk with which the update information of firmware and the update information of light strategy were recorded as text data, a CD-R disk, and a CD-RW disk (usually CD-DA disk) as the optical disc 101. When equipped with such an optical disc 101, Renewal of firmware and renewal of light strategy are made as follows using the update information of firmware and the update information of light strategy which were recorded on such an optical disc 101 as CD-TEXT.

[0118] If equipped with the CD-DA disk with which the update information of firmware and the update information of light strategy were recorded as text data, a CD-R disk, and a CD-RW disk as the optical disc 101, It is played by the optical pickup 102 and the optical disc 101 is supplied to the EFM demodulator circuit 122 via the playback amplifier 121. From the output of the EFM demodulator circuit 122, the data of a sub-code is taken out and the data of this sub-code is supplied to the CD-TEXT decoder 126 via the sub-code decoder 125. By the CD-TEXT decoder 126, the text data currently recorded as CD-TEXT is read. The output of this CD-TEXT decoder 126 is supplied to the microprocessor 116.

[0119] It is judged whether there is any identifier of 1= 86 h of ID which shows that it is data for updating to the data of this CD-TEXT by the microprocessor 116, When it is judged that there is an identifier of 1= 86 h of ID, the identifier of (1= 86h of ID) is "FWDATA", and it is judged whether it is the update information of firmware.

[0120] And if it is judged from that identifier that it is the update information of firmware, the text data of ID1=8Ch will be read and this text data will be changed into binary data. And the program of the rewriting area 134A is rewritten with this binary data among the programs currently recorded on the program memory 134. Thereby, renewal of firmware is made.

[0121] When it is judged from an identifier that it is not the update information of firmware, the identifier of (1= 86h of ID) is "WSDATA", and it is judged whether it is the update information of light strategy. If it is judged that it is the update information of light strategy, the text data of ID1=8Ch will be read and this text data will be changed into binary data. And the parameter of the light strategy memorized by the light strategy memory 131 is rewritten with this binary data. Thereby, renewal of light strategy is made.

[0122] When it is judged that there is no identifier of 1= 86 h of ID, display processing of usual CD-TEXT is performed and the text is displayed on the indicator 133.

[0123] As mentioned above, as explained, in this embodiment of the invention, the update information of light strategy and the update information of firmware are changed into text data, and are recorded as CD-TEXT. Thereby, even when it is disk recording playback equipment only for music which cannot carry binary data, renewal of light strategy and renewal of firmware can be performed easily.

[0124] Although the example of renewal of light strategy or renewal of firmware was shown, this invention is applicable also like other data or renewal of a program.

[0125] Although an identifier is described to 1= 86 h of ID and he is trying to record the update information changed into ID1=8Ch at the text data in an above-mentioned example, it is not limited to this. Other ID of CD-TEXT may be made into an identifier, or may be used for record of update information. For example, in the format of CD-TEXT, ID1=8Ah and ID1=8Bh besides ID1=8Ch are reserved. It may be made to record the update information changed into the text data using here. It may be made to record separate data on ID1=8Ah, ID1=8Bh, and ID1=8Ch as text data, respectively.

[0126] Although binary data like update information like light strategy and the update information of firmware is changed into text data and he is trying to record it in an above-mentioned example, It may be made to describe here the program language or script language described by the text data, for example.

[0127] In this case, the interpreter for interpreting and performing the compiler which changes program language into the program of feasible form, or this script language in data recording playback equipment is prepared. It enables it to perform operation of disk recording playback equipment using a browser, and may be made to describe a language like JAVA (registered trademark) as CD-TEXT. The program language for updating is described by text data, and is recorded on a disk as CD-TEXT.

[0128] Playback of such a disk will play the program language described by the text data played as CD-TEXT. This program language is changed into the program of feasible form by the compiler, and is performed. Or this script language is interpreted by the interpreter and performed. A language like JAVA (registered trademark) is performed on a browser. Renewal of light strategy and renewal of firmware can be performed using such program language or a script language.

[0129] [Effect of the Invention]

According to this invention, the update information of firmware and the update information of light strategy are recorded on a disk as text data of CD-TEXT. An identifier is described by 1= 86_h of ID which shows disk ID. If an identifier is detected from the regenerative data of CD-TEXT, based on this identifier, From the text data reproduced as CD-TEXT, the update information of firmware and the update information of light strategy are formed, and, thereby, update information of firmware and update information of light strategy are performed.

[0130] Thus, in this invention, since the data of CD-TEXT is used, renewal of form wear and renewal of light strategy can be easily performed also in the case of disk recording playback equipment for music which cannot carry binary data.

[0131] And by detecting the identifier of CD-TEXT, since it can judge the data about what is recorded as CD-TEXT, renewal of data can be easily performed without a user's special operation. Since the usual music data is recordable as data of a program area, while reproducing music data, renewal of firmware and renewal of light strategy can be performed.

[Claim(s)]

[Claim 1] The 1st disk characterized by comprising the following with which text information to which an identifier is given is recorded, and the 2nd disk that can be written in are removable disk recording playback equipment selectively.

A reproduction means which plays text information to which an identifier is given from the 1st disk of the above when equipped with the 1st disk of the above.

A recording device which records data to the 2nd disk of the above when equipped with the 2nd disk of the above.

A memory means a program or a preset value about the above-mentioned recording

device is remembered to be.
A discriminating means which distinguishes whether a program or a preset value about record reproduction memorized by the above-mentioned memory means based on the above-mentioned text information is updated based on an identifier given to text information reproduced in the above-mentioned reproduction means.

[Claim 2] Based on an identifier given to text information reproduced in a displaying means which displays text information reproduced in the above-mentioned reproduction means, and the above-mentioned reproduction means, The disk recording playback equipment according to claim 1 further provided with the 2nd discriminating means that distinguishes whether text information played in the above-mentioned reproduction means is displayed.

[Claim 3] The above-mentioned identifier is written disk recording playback equipment to claim 1 being able to distinguish whether the above-mentioned text information relates to a program about record reproduction.

[Claim 4] The disk recording playback equipment according to claim 1 whose preset value about the above-mentioned record reproduction is a recording condition value to the 2nd disk with which makers differ.

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(71) Applicant: KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors: KITZLER, Andreas; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). WIMMER, Wolfgang; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). HOMER, Alois; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(74) Agent: WEBER, Helmut; Internationaal Octrooibureau B.V., Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

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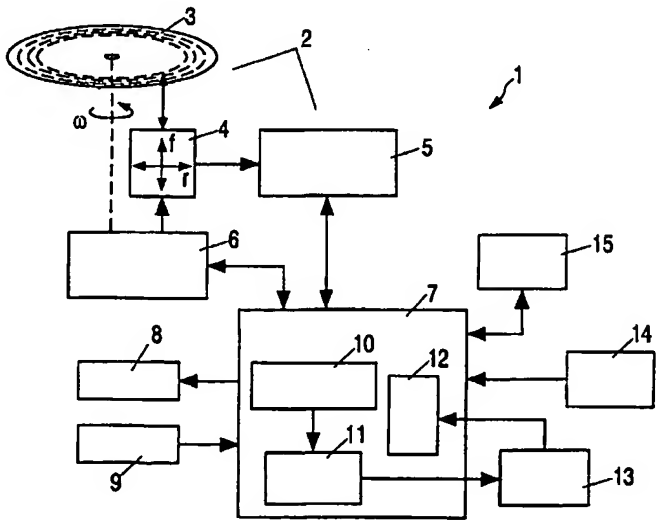
(54) Title: RECORD CARRIER FOR STORAGE AND REPRODUCTION ARRANGEMENT AND STORAGE ARRANGEMENT FOR PROCESSING DATA NOT RELATED TO THE RECORD CARRIER



(57) Abstract: In a preferably disc-like scannable record carrier (3) which contains at least one subcode channel, strange data not related to the disc-like record carrier (3) are stored in the at least one subcode channel. A playback device (1) for scanning such a disc-like record carrier (3) includes playback device data processing means (5, 10) which are arranged for processing strange data formed by update data, which update data are transferred to non-volatile memory means (13) for updating a routine of a function unit (12).

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Record carrier for storage and reproduction arrangement and storage arrangement for processing data not related to the record carrier

The invention relates to a scannable record carrier which contains at least one subcode channel, data being stored in the at least one subcode channel.

The invention further relates to a playback device for playing back data of such a record carrier stored in a subcode channel and to a recording device for recording data in a subcode channel of such a record carrier.

The invention further relates to a recording device for recording a record carrier, there being a possibility for subcode channel data to be stored in at least one subcode channel.

Such a record carrier and such a playback device have been developed and marketed by the applicants and are therefore known. They are a so-termed Audio-Compact disc CD and a so-termed Audio-CD player or CD player, respectively. According to the industrial Audio-CD standard or CD-DA standard (Red Book), respectively, such a CD contains so-termed subcode data channels, which subcode data channels are contained in the so-termed main channel in the time-multiplex mode in the audio data stream. The total of eight (8) existing subcode data channels are referred to as P, Q, R, S, T, U, V and W channels. The data from the subcode data channels enable the CD player to playback additional information, such as, for example, the elapsing time during playback of a track stored on a CD, which elapsing time is stored in the Q subcode channel, or the name of a track and/or the associated interpreters. The great disadvantage with this known data carrier and with the known playback device is that always data relating only to the main channel situated on the record carrier are stored in the subcode channels and, consequently, only such data can be processed. For the known record carrier there are only possibilities of using data relating to the main channel and present on the record carrier for various purposes. This means a limitation bounding, however, the possibilities of use of such a record carrier.

It is an object of the invention to eliminate the above-mentioned limitations and provide an improved record carrier and an improved playback device and an improved recording device.

To achieve the above-mentioned object in a record carrier according to the invention, characteristic features according to the invention are provided so that a record carrier according to the invention can be characterized in the manner defined below, that is:

A record carrier, which record carrier can be scanned and contains at least one subcode channel, data being stored in the at least one subcode channel and the data stored in the at least one subcode channel being formed by strange data not related to the record carrier.

To achieve the object defined above a playback device according to the invention has features according to the invention so that a playback device according to the invention can be characterized in the manner defined below, that is:

A playback device for scanning a record carrier, which record carrier contains at least one subcode channel, data being stored in the at least one subcode channel, the playback device comprising a scanning device for scanning the record carrier and playback data processing means for processing the data stored in the at least one subcode channel, the playback data processing means being arranged for processing strange data not related to the record carrier.

To achieve the object defined above a recording device according to the invention has features according to the invention so that a recording device according to the invention can be characterized in the manner defined below, that is:

A recording device for writing a record carrier on which subcode channel data can be stored in at least one subcode channel, the recording device comprising a writing device for writing the record carrier and recording data processing means for processing data to be stored in the subcode channel, the recording data processing means being arranged for processing strange data not related to the record carrier.

By providing the measures according to the invention an improved record carrier and an improved playback device and an improved recording device are obtained in a simple manner, a very important improvement being that in the subcode channels of the record carrier can be stored data not related to the record carrier, to be called strange data hereinafter, with the improved recording device and can be processed by the improved playback device. Such a system comprising the improved record carrier and the improved playback device enables, for example, an updating of data used in the playback device, which do not consist of data related to the record carrier. The strange data form, for example, update data, thus updated data to control the playback device, with which update data an update of routines executed in the playback device can be effected.

At this point it may be observed that an update possibility of data not related to the record carrier can be effected by a record carrier that meets a so-termed CD-ROM standard, one playback device, however, then being necessary for this case which has to comprise a much more complex and expensive arrangement, which is highly disadvantageous in respect of the attendant circuitry and cost.

Providing the characteristic feature as claimed in claim 3 makes a very simple storage and reading possible of the strange data, because conventional integrated circuits provided for decoding the subcode channels have a separate connection, thus a simple access to the data of the Q subcode channel, so that no additional cost of hardware is necessary.

By providing the characteristic features as claimed in claim 4 or claim 5 or claim 6, respectively, the advantage is offered that finding back the strange data or update data is simplified, because less stringent requirements as to accuracy for the implementation of a positioning of a for example optically working reading unit of the playback device will be sufficient.

A playback device according to the invention as claimed in the claims 8, 9 and 10 and a recording device according to the invention as claimed in claims 11 and 12 are further arranged according to the requirements and advantageously so that they can cooperate with a record carrier as claimed in the claims 3 to 7 as a result of which the advantages inherent in such a record carrier as claimed in the claims 3 to 7 are obtained for the playback device and the recording device according to the invention.

In connection with the playback device as claimed in claim 10 it should further be observed that update data can also be applied with the aid of the updating device to an apparatus external to the playback device in order to be able to execute an updating operation in this external apparatus.

These and other aspects of the invention are apparent from and will be elucidated with reference to the embodiments described hereinafter.

The invention will be further described with reference to an example of embodiment shown in the drawing to which, however, the invention is not limited.

Fig. 1 shows in a diagrammatic manner in the form of a block circuit diagram an essential part of a playback device in the present connection in accordance with an example of embodiment of the invention, which playback device is provided for playing back information digitally stored on a disc-like record carrier that can be read out optically.

Fig. 2 shows a flow chart of an update routine which can be executed in the playback device as shown in Fig. 1.

Figs. 3A and 3B schematically show update data which are stored in a subcode channel of an optically readable record carrier and Fig. 3C shows a possible concatenation of the stored update data.

Fig. 4 shows in a diagrammatic manner in the form of a block circuit diagram in the present connection an essential part of a recording device in accordance with an example of embodiment of the invention.

Fig. 1 represents a playback device 1.The playback device 1 comprises an optical disc player 2, which optical disc player 2 is provided and arranged for reproducing digitally stored information or data, respectively, which can be read in an optical manner and with a record carrier 3 rotating at an angular velocity ω. The record carrier 3 which can be read optically is in this case in the form of a compact disc CD. The digital information is then stored in tracks on the record carrier 3 in accordance with the CD-DA standard (Red Book). It may be observed that the CD is a so-termed CD-R type or CD-RW type. The information or data, respectively, which is digitally stored on the optically readable record carrier 3 can be read out and transmitted to a decoding circuit 5 by a scanning device, which scanning device may comprise an optical reading unit 4 that can be positioned. The decoding circuit 5 is further provided for error correction. The decoded and error-corrected data are transmitted to a central processing unit (CPU) 7.

The central processing unit (CPU) 7 is coupled to a RAM memory 15, a ROM memory 14 and a non-volatile memory 13. The RAM memory 15 and the ROM memory 14 are provided to control and to process a data stream which is applied to the central processing unit (CPU) 7 from the decoding circuit 5. The non-volatile memory 13 is provided to store update data. The central processing unit (CPU) 7 is further coupled to a servo system 6, which servo system 6 controls the angular velocity ω of the optically readable record carrier 3 as well as the position of the reading unit 4. Control of the reading unit 4 is effected both with respect to the tracks arranged on the record carrier 3, thus radially relative to the optically readable record carrier 3, as this is indicated by the dashed arrow r, and with respect to a focus or focal point, respectively, thus normally relative to the optically readable record carrier 3 as this is indicated by the dashed arrow f. The central processing unit (CPU) 7 further includes subcode date processing means 10, an updating device 11 and a module unit

12. The subcode data processing means 10 are provided to process subcode data, the subcode data are taken from the data that are decoded in the decoding circuit 5. The decoding circuit 5 and the subcode data processing means 10 thus represent an essential part of playback data processing means. The updating device 11 is provided to process and deliver update data to the non-volatile memory means 13. The module unit 12 represents in the present case a speech control module, which speech control module is provided to control the playback device 1 by means of voice commands. The module unit 12 is connected to a non-volatile memory 13 and provided to process the update data stored therein. It may be observed that the module unit 12 may as well be formed by another module unit or functional unit, such as, for example, a tuner unit or an amplifier unit or a CD control unit or a display unit and the like. The central processing unit (CPU) 7 is further connected to display means 8 which in the present case are formed by a display, and to input means 9 which are formed by a keyboard and provided to issue control commands.

In Figs. 3A and 3B are schematically shown data words or data sequences, respectively, as an example for a possible configuration of update data. Fig. 3A then shows an identification data sequence IDS, which identification data sequence IDS comprises a total of 98 bits and contains the bit blocks S0, S1, CTRL, ADDR, ID, MANUFACTURER, DEVICE, MODULE, FILES and CRC, which have different block lengths as a result of different numbers of bits, as is shown in Fig. 3A. Fig. 3B shows a useful data sequence NDS, which useful data sequence NDS also contains a total of 98 bits, that is the bit blocks S0, S1, CTRL, ADDR, ID, FILE, LPI, DATAPI, DATA and CRC. As is defined in the CD-DA standard, the data words are stored sequentially, thus successively on the optically readable record carrier. In the present case the identification data sequences IDS and the useful data sequences NDS in the Q-subcode channel are stored in the time-multiplex mode in accordance with the CD-DA standard. An identification data sequence IDS is then always stored ahead of a number of useful data sequences NDS, the number of the useful data sequences NDS being determined by a value of the identification data sequence IDS represented in the bitblock FILES. The bit block MANUFACTURER is used for storing identification data specifying a manufacturer, the bit block DEVICE accommodates code data relating to a certain device of the manufacturer, the bit block MODULE stores code data relating to a certain module of the device and the bit block FILES stores a value representing a number of files in which the data are stored for the update. Reference is in this respect made to Fig. 3C by way of explanation in which an example of a series of identification data sequences IDS and useful data sequences NDS for module M is represented by a file index

F. In the bit block FILE of the useful data sequence NDS is stored a file index which features the association of the useful data sequence NDS with a certain file. As is evident from Fig. 3C, the file index is continuously incremented for each file, even when a new module follows (the first file of the module 1 begins with the file index F=3). Such an arrangement of data sequences makes a relatively simple positioning of the optical reading unit 4 on a specific file possible.

A file is formed by data packets, a data packet index being stored in the bit block DATAPI of the useful data sequence NDS. The bit LPI of the useful data sequence NDS signals whether the end of a file has been reached. A further explanation hereof is given in conjunction with the description of Fig. 2.

The following description of the bit blocks S0, S1, CTRL, ADDR, ID and CRC holds both for the identification data sequence IDS and for the useful data sequence NDS.

The bit block ID, consisting of one bit, signals whether it is an identification data sequence IDS or a useful data sequence NDS.

The bit block ADDR is used for storing a mode as is provided according to the CD-DA standard. The mode four (4) is chosen here in the present example of embodiment. It may be observed that from the available modes also another mode may be chosen, for example mode 6 or mode 8.

The bit block CTRL contains in accordance with the CD-DA standard a number of audio channels, copy protection information and pre-emphasis information. In the present example of embodiment all the bits of the bit block CTRL are chosen to be logic zero (0).

The bit blocks S0 and S1, which each consist of only one bit, represent synchronisation bits and the bit block CRC represents a check sum in accordance with the CD-DA standard.

In the following a routine is described which routine is executed in the updating device 11 and as a result stores the desired update data in a non-volatile memory.

Fig. 2 shows in the form of a flow chart a routine executed in the playback device 1 as shown in Fig. 1. Said routine is started after being activated by means of a keyboard command from keyboard 9 while the playback device 1 is brought to a so-termed update mode. The change of state may then be displayed on the display 8. It may be observed that said routine may also be started in another way, for example, on the basis of a "self

recognition"of the CD, an automatic start of the routine then following once the CD has been recognized by the playback device 1.

As is shown in Fig. 2, the routine is started at a block 20. After block 20 there is an initialization of variables in a block 21. In the present case an identification variable CD_ID is initialized with a logic zero (FALSE), a number-of-files variable NROFFILES, a file-count variable FILECNT and a data packet variable LASTPACKAGE are initialized with a hexadecimal value 0xFF. After the initialization in the block 21 a test is made in block 22 whether a new subcode data block is available in the subcode data processing means 10, the test being repeated until a new subcode data block is available. In a so-termed single speed mode operation of the CD according to the CD-DA standard, a subcode data block is available every 13.3 ms. It may be stated that the CD can also be operated for example in a double speed mode, a subcode data block then being available every 13.3/2 ms. Thus if new subcode data are available, the routine is continued at block 23. At the block 23 a test is made whether the mode value stored in ADDR is equal to a value four (4). In the event of a negative result (NO) of this query, the routine is proceeded with block 22, thus a new subcode data block is waited for. If the test result is positive (YES) at a block 23, block 24 is proceeded with. At block 24 there is a test of the ID bits; when an ID bit is set (logic 1) a block 30 is proceeded with and otherwise a block 25. In the block 25 the identification variable CD_Id is set to logic zero (FALSE) and successively proceeded with a block 26. At the block 26 a test is made whether the value stored in the bit block MANUFACTURER corresponds with a value that is predefined and features a manufacturer. In case of a negative result, thus no correspondence (NO) of this query, the routine is terminated. In case of correspondence, thus a positive result (YES) with the block 26, block 27 is proceeded with. At the block 27 a test is made whether the value stored in the bit block DEVICE corresponds with a value that is predefined and features a device of a manufacturer. In case of a negative result (NO) of this query the routine is terminated. In case of a positive result (YES) at the block 27, block 28 is proceeded with. At the block 28 a test is made whether the value stored in the bit block MODULE corresponds with a value that features a module of a device. In case of a negative result (NO) of this query the routine is terminated. In case of a positive result (YES) at the block 28, block 29 is proceeded with. At the block 29 the identification variable CD_ID is set to logic one (TRUE), the value of the bit block FILES of the identification data sequence IDS is assigned to the number-of-files variable NROFFILES and the file-count variable FILECNT is increased by the value of the bit block FILES of the

identification data sequence IDS and subsequently the routine is proceeded at block 22, thus a new subcode data block is waited for.

As has already been observed, the routine is continued at block 30 with a set ID bit (logic 1) during the test at block 24. At the block 30 the logic value of the identification variable CD_ID is tested. If the logic value of the identification variable CD_ID is logic 1 (TRUE) the routine is proceeded with at block 31, otherwise block 22 is proceeded with, thus a new subcode data block is waited for. At block 31 a test is made whether the value of the bit block FILE of the useful data sequence NDS is smaller than the value of the file-count variable FILECNT and larger than a difference between the value of the file-count variable FILECNT and the value of the number-of-files variable NROFFILES. With a positive result of the test at the block 31, the routine is continued at a block 32, otherwise at the block 22. At the block 32 the logic value of the LPI bit of the useful data sequence NDS is tested. If the logic value of the LPI bits is logic 1 (TRUE), the routine is continued at a block 33, otherwise it is continued at a block 34. At block 34 a test is made whether the data packet variable LASTPACKAGE is equal to the value of the bit block DATAPI of the useful data sequence NDS. In case of a negative result (NO) of this query at block 34 the routine is continued at a block 35, otherwise a new subcode data block is waited for again at the block 22. At the block 35 the value of the data packet variable LASTPACKAGE is incremented by unity (1) and the data of the bit block DATA of the useful data sequence NDS, which data of the bit block DATA finally represent the effective updata data, are buffered in the RAM memory 15. Ultimately, at block 33 which is executed when block 32 shows a negative result (NO) all the data buffered in the RAM memory 15 of the data of the bit block DATA of the useful data sequence NDS received thus far are transmitted to the non-volatile memory 13 and subsequently the routine is terminated.

Fig. 4 shows a recording device 21. The recording device 21 comprises an optical disc recording system 22, which optical disc recording system 22 is provided to write a record carrier 23 that can be optically recorded and rotates with an angular velocity ω. The record carrier 23 is prefereably a CD-R or CD-RW. It may be stated that the record carrier 23 may also be a so-termed glass master which is used in a so-termed mastering and replication process for manufacturing pressed CDs, as this is known in expert circles. The recording device 21 comprises a positionable writing device 24 with the aid of which it is possible to store digital information or data, respectively, according to the CD-DA standard (Red Book or Orange Book, respectively, extended for CD-R/RW) on the record carrier 23, and a

recording device control unit 25 connected to the optical recording device 24. The data to be stored are conveyed from a central processing unit 27 to the writing device control unit 25.

The central processing unit (CPU) 27 comprises a CD data coding device 20 as well as subcode data generation means 19 and is connected to a RAM memory 28 and a ROM memory 29. The RAM memory 28 and the ROM memory 29 being connected to the central processing unit (CPU) 27 are provided to control the storing of digital information on the record carrier 23. The central processing unit (CPU) 27 is further coupled to a servo system 26, which servi system 26 controls the angular velocity ω of the optically readable record carrier 23 as well as the position of the optical recording device 24.

The CD data coding device 20 and the subcode data generation means 19 form the essential part of recording device data processing means for processing data to be stored in a subcode channel. The recording device 21 further includes update data generation means 18 which are provided and arranged for generating of preparing, respectively, update data UD in accordance with the data blocks indicated in the Figs. 3A and 3B. The update data UD are delivered, for example, as ASCII data to the subcode data generation means 19, in which subcode data generation means 19 the update data UD are converted so that they can be stored in the Q subcode channel in accordance with the CD-DA standard. The reference to the CD-DA standard is only to be understood with respect to the generation or interleaving and coding. It should be observed that instead of the Q subcode channel in equal manner any other available subcode channel, for example, the P subcode channel can be used for the storage. The update data converted to subcode data are delivered to the CD data coding device 20 in which CD data coding device 20 then follows a coding into so-termed frames and blocks in accordance with the CD-DA standard. In the main channel defined according to the CD-DA standard an audio silence is additively stored. It may be stated that instead of audio silence also a track or audible advertising may be stored.

CLAIMS:

1. A record carrier (3, 23), which record carrier (3, 23) can be scanned and contains at least one subcode channel, data being stored in the at least one subcode channel and the data stored in the at least one subcode channel being formed by strange data not related to the record carrier (3, 23).

2. A record carrier (3, 23) as claimed in claim 1 wherein the strange data are formed by update data, which update data can be applied to an update device (11) included in a playback device (1) for scanning the record carrier (3, 23).

3. A record carrier (3, 23) as claimed in claim 1 or claim 2 wherein the strange data are stored in a Q-subcode channel.

4. A record carrier (3, 23) as claimed in claim 2 or claim 3 wherein the strange data comprise identification data sequences (IDS) and data sequences (NDS) associated to the identification data sequences (IDS), an identification data sequence (IDS) being stored before an associated data sequence (NDS).

5. A record carrier (3, 23) as claimed in claim 4 wherein immediately after the stored identification data sequence (IDS) this identification data sequence (IDS) is additionally stored repeated at least once.

6. A record carrier (3, 23) as claimed in claim 4 or claim 5 wherein at least part of the data sequences (NDS) associated to the identification data sequences (IDS) is stored at least once more.

7. A record carrier (3, 23) as claimed in claim 1 wherein the record carrier (3, 23) is designed in a disc-like form and can be scanned optically.

8. A playback device (1) for scanning a record carrier (3, 23), which record carrier (3, 23) containing at least one subcode channel, data being stored in the least one subcode channel, the playback device (1) including a scanning device (4) for scanning the record carrier (3, 23) and playback data processing means (5, 10) for processing the data stored in the at least one subcode channel, the playback data processing means (5, 10) being provided to process strange data not related to the record carrier (3, 23).

9. A playback device (1) as claimed in claim 8 wherein the playback device data processing means (5, 10) are arranged for processing update data provided as strange data and in which the updating device (11) is provided, to which updating device (11) the update data processed and delivered by the playback data processing means (5, 10) can be applied.

10. A playback device (1) as claimed in claim 8, wherein storage means (13) are provided to which storage means (13) the update data are applied with the aid of the updating device (11).

11. A recording device (21) for writing a record carrier (3, 23), in which record carrier (3,23) subcode channel data can be stored in at least one subcode channel, the recording device (21) comprising a writing device (24) for writing the record carrier (3, 23) and recording device data processing means (19, 20) for processing of the data to be stored in the subcode channel, the recording device data processing means (19, 20) being arranged for processing strange data not related to the record carrier (3, 23).

12. A recording device (21) as claimed in claim 11, wherein the recording device data processing means (19, 20) being arranged for processing update data provided as strange data.

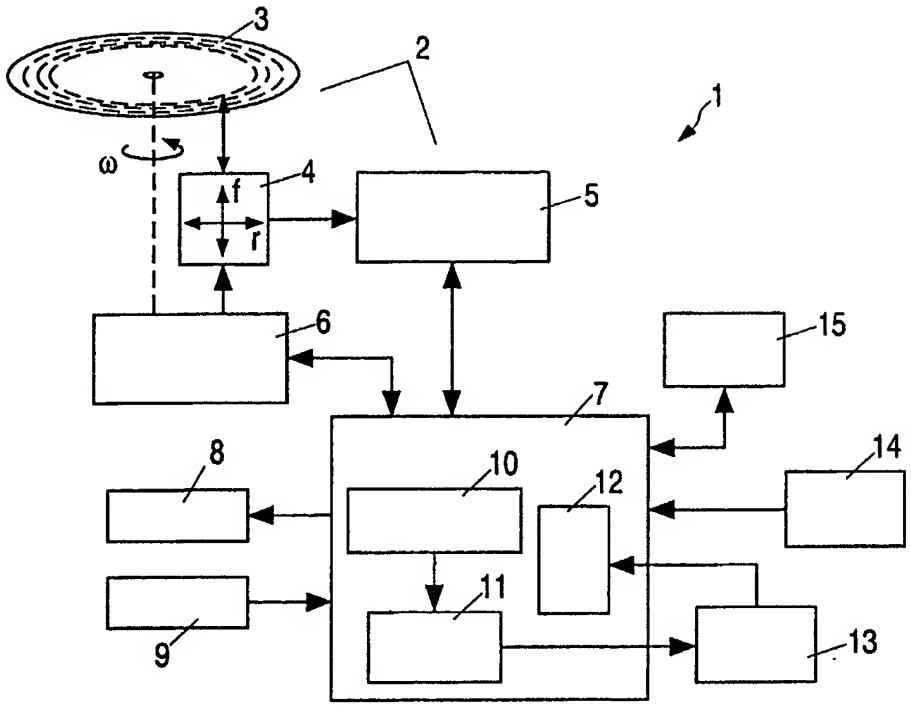


Fig.1

IDS

	S0	S1	CTRL	ADDR	ID	MANUFACTURER	DEVICE	MODULE	FILES	CRC
BITS	1	1	4	4	1	36	16	15	4	16

Fig.3A

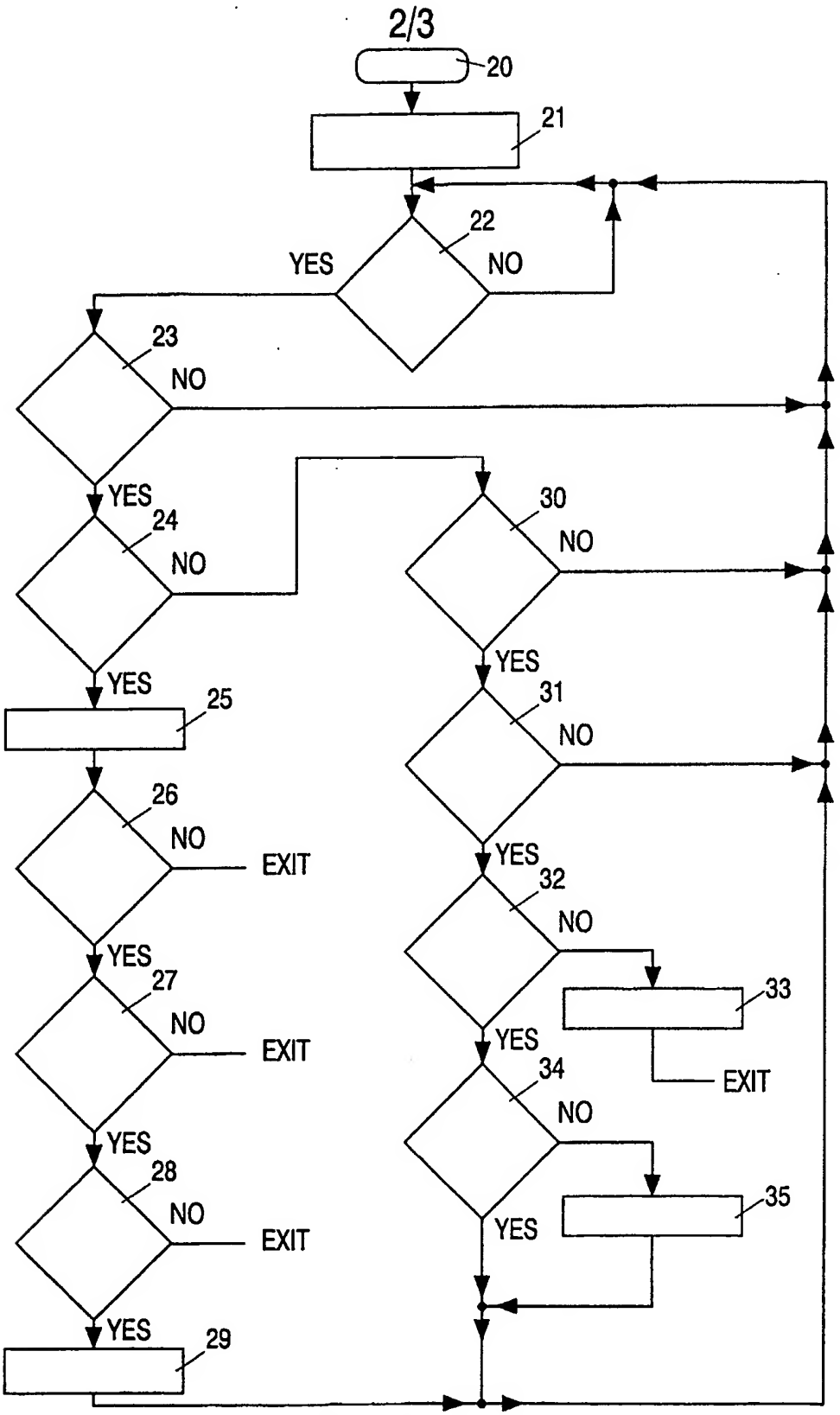
NDS

	S0	S1	CTRL	ADDR	ID	FILE	LPI	DATAPI	DATA	CRC
BITS	1	1	4	4	1	4	1	18	48	16

Fig.3B

IDS	NDS			IDS	NDS		
M=0	M=0 F=0	M=0 F=1	M=0 F=2	M=1	M=1 F=3	M=1 F=4	M=1 F=5

Fig.3C


20
21
22
YES
NO
23
NO
YES
24
NO
YES
25
26
NO
EXIT
YES
27
NO
EXIT
YES
28
NO
EXIT
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NO
33
EXIT
YES
34
NO
35
YES

Fig. 2

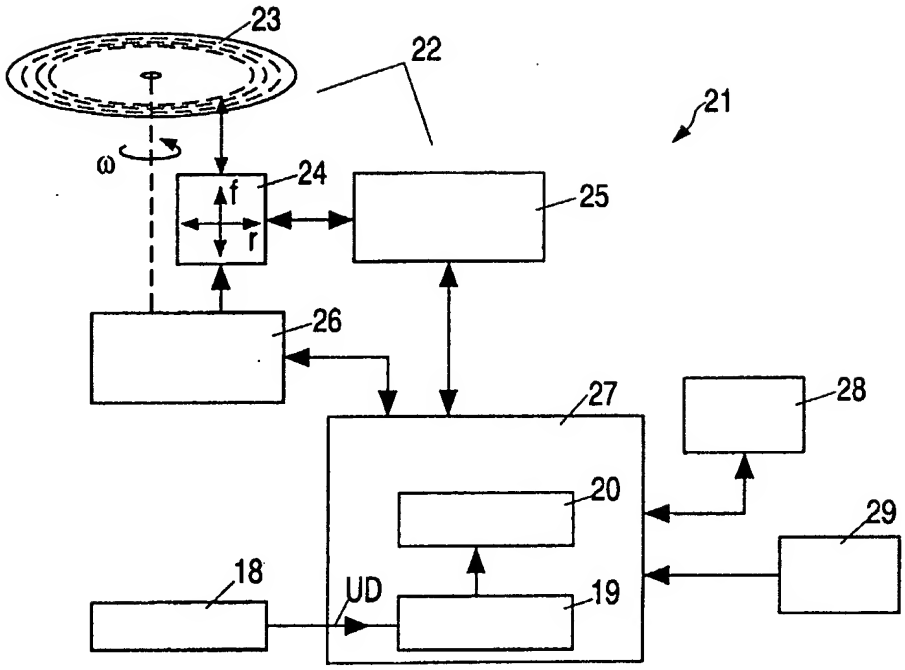

Fig.4